

CONVECTIVE STRUCTURE OF THE PLANETARY
BOUNDARY LAYER OVER THE OCEAN DURING GALE

S.H. Melfi and R. Boers
Laboratory for Oceans
NASA Goddard Space Flight Center
Greenbelt, Maryland, U.S.A.

The structure of the Planetary Boundary Layer (PBL) has been measured, using an airborne lidar, over the Atlantic Ocean during several intensive observation periods of the Genesis of Atlantic Lows Experiment (GALE).

Primary emphasis of this paper will be on the understanding of the convective structure within the PBL during cold air outbreaks. Cold outbreaks generally occur in between the development of coastal storms. They occur behind a cold front which sweeps down from Canada out across the Atlantic. As the cold dry air moves over the relatively warm ocean waters, it is heated and moistened. The transfer of latent and sensible heat during these events accounts for most of the heat transfer between the ocean and atmosphere during the winter. The moistening of the PBL during these events is believed to be an important factor in determining the strength of development of the storm system which likely follows. In general, the more PBL moisture which is available as latent heat the higher the probability that the storm will intensify.

The major mechanism for vertical mixing of heat and moisture within the PBL is cellular convection. Knowledge of the organization and structure of the convection is important for understanding the process.

Data from the downward-looking airborne lidar will be presented which clearly shows the structure of the convective cells both along and across the direction of the low level winds. The importance of the entrainment zone at the PBL top will be discussed as it relates to heat transfer at the ocean surface.